UNITED STATES PATENT AND TRADEMARK OFFICE

H·A

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/277,893	03/29/1999	KENNETH W. MARR	3543US(97-95	4223

7590 05/02/2007

BRICK G POWER
TRASK BRITT & ROSSA
P O BOX 2550
SALT LAKE CITY, UT 84110

EXAMINER	
RICHARDS, N DREW	

ART UNIT	PAPER NUMBER
2815	

MAIL DATE	DELIVERY MODE
05/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/277,893
Filing Date: March 29, 1999
Appellant(s): MARR, KENNETH W.

Brick Power
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/29/06 appealing from the Office action mailed 12/8/05.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

February 14, 2005, the Board of Patent Appeals and Interferences issued a decision in U.S. Application Number 09/277,893.

December 31, 2003, the Board of Patent Appeals and Interferences issued a decision in U.S. Application Number 09/702,583. The '583 application was filed as a divisional of the instant application.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,185,291	FISCHER ET AL.	2-1993
5,712,206	CHEN	1-1998
JP 3-59-154038	MITANI	9-1984
5,231,056	SANDHU	7-1993
5,242,859	DEGELORMO ET AL.	9-1993
6,069,055	UKEDA ET AL.	5-2000

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 17, 19-24, 26-33, 102 and 103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al. in view of Chen (USPAT 5712206).

Fischer et al. discloses a method of fabricating a fuse upon a semiconductor device in figures 1 – 3.

With regard to claim 17, in figure 1 Fischer et al. discloses disposing a layer of conductive material (11) over an insulative structure (10) of the semiconductor device. Fischer also discloses in figure 1 patterning the layer of conductive material to define at least two spaced apart terminal sites. Fischer et al. also discloses in figure 3 removing conductive material of the layer in areas around the spaced apart terminal sites. Fischer et al. discloses in figure 2 disposing a second conductive layer (12) over the semiconductor device, including adjacent to the insulative structure exposed between the at least two terminal sites. In figure 3 Fischer et al. discloses patterning the second conductive layer so as to define at least two terminal regions of the fuse, each of which is in contact with a corresponding one of said at least two terminal sites of conductive material, and a central region disposed between the at least two terminal regions and in contact with the insulative structure. Fischer et al. does not disclose the second conductive layer as a metal silicide. Chen teaches in column 5, lines 57 – 65 a conductive layer (62) for a fuse that is a metal silicide. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the metal silicide layer of Chen in the method of fabricating a fuse upon a semiconductor device of Fischer et al. in order to use a preferred conductive material for the fuse that is well known in the art as stated by Chen in column 5, lines 57 – 65.

With regard to claims 19, the method of Fischer et al. discloses in column 3, lines 42 - 50 patterning the layer of conductive material comprising disposing a mask over the semiconductor device and removing selected regions of the layer of conductive material through the mask.

With regard to claim 20, Fischer et al. does not disclose that the mask is photoresist. It is well known in the art to dispose a photoresist mask onto the semiconductor device, expose selected regions of the photoresist and develop the selected regions. It would have been obvious

to one of ordinary skill in the art at the time of the present invention to use the photoresist method in the method of Fischer et al. in order to pattern the metal layer.

With regard to claims 21 and 22, the method of Fischer et al. discloses in column 3, lines 34 – 50 that the removing comprises isotropically etching the selected regions of the layer of conductive material through the mask.

With regard to claim 23, Fischer et al. does not disclose etching the selected regions of the layer of conductive material with a wet etch. It is well known in the art that etching can comprise wet etching the selected regions of the layer of conductive material. It would have been obvious to one of ordinary skill in the art to use the wet etching method in the process of Fischer et al. in order to etch the conductive material with tapered edges.

With regard to claim 24, Fischer et al. discloses in column 2, lines 45 – 48 disposing the layer of conductive material comprises chemical vapor depositing the layer of conductive material.

With regard to 26, Chen discloses in column 5, lines 57 – 65 the metal silicide is tungsten silicide.

With regard to claim 27, the method of Fischer et al. and Chen inherently disclose patterning the layer of metal silicide comprising disposing a mask over the semiconductor device and removing selected regions of the layer of metal silicide through the mask.

With regard to claim 28, Fischer et al. and Chen do not disclose that the mask is photoresist. It is well known in the art to dispose a photoresist mask onto the semiconductor device, expose selected regions of the photoresist and develop the selected regions. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the photoresist method in the method of Fischer et al. and Chen in order to pattern the metal silicide.

With regard to claims 29 and 30, the method of Fischer et al. and Chen inherently disclose that the removing comprises anisotropically etching the selected regions of the layer of metal silicide.

With regard to claim 31, Fischer et al. does not disclose etching the selected regions of the layer of the metal silicide with a dry etch. It is well known in the art that etching can comprise

dry etching the selected regions of the layer of metal silicide. It would have been obvious to one of ordinary skill in the art to use the dry etching method in the process of Fischer et al. and Chen in order to etch the metal silicide with vertical edges.

With regard to claim 32, it is inherent that a contact is disposed in communication with at least one of the at least two terminal regions.

With regard to claim 33, it is inherent that another contact is disposed in communication with another of the at least two terminal regions.

With regard to claim 102, in Fischer et al. figure 3 the removing comprises exposing the insulating structure 10 around the terminal sites.

With regard to claim 103, the removing comprises exposing the insulating structure beneath the areas.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al. and Chen as applied to claim 17 above, and further in view of Mitani (JPPAT 59-154038).

With regard to claim 18, Fischer et al. and Chen do not disclose that disposing the layer of the conductive material comprises disposing polysilicon onto the insulative structure. Mitani discloses in figures 1 and 2 disposing polysilicon (5) as a conductive material for a fuse structure (3). It would have been obvious to one of ordinary skill in the art at the time of the present invention to dispose the polysilicon of Mitani in the method of Fischer et al. and Chen in order to dispose a conductive material layer that will be both part of the fuse component and a gate electrode as stated by Mitani in the abstract and constitution.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al. and Chen as applied to claim 17 above, and further in view of Sandhu.

With regard to claim 26, Fischer et al. and Chen do not disclose that the layer of metal silicide is deposited by chemical vapor deposition. Sandhu discloses in figure 1 that depositing the layer of metal silicide (12) comprises chemical vapor depositing the layer of metal silicide. It

would have been obvious to one of ordinary skill in the art at the time of the present invention to use the chemical vapor deposition process of Sandhu in the method of Fischer et al. and Chen in order to deposit a metal silicide film characterized by low impurities, good step coverage, and low stress with the silicon substrate as taught by Sandhu in the abstract.

Claims 50, 51, 55-60 and 62-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al. in view of Mitani and Chen.

With regard to claim 50, Fischer et al. discloses in figures 1 – 3 a method of fabricating a fuse. Fischer et al. discloses in figure 1 fabricating spaced (111) apart terminal sites comprising a first conductive layer (11) on an insulative structure (10) of a semiconductor device, the insulative structure being exposed between the terminal sites. Fischer et al. discloses in figures 2 and 3 fabricating a fuse comprising a second conductive layer (12), including a central region disposed adjacent the insulative structure and between the spaced apart terminal sites and at least two terminal regions disposed on opposite ends of the central region and adjacent the space apart terminal sites. Fischer et al. does not disclose that the first conductive layer comprises polysilicon on the insulative structure. Mitani discloses in figures 1 and 2 polysilicon (5) as a conductive layer for a fuse structure (3). It would have been obvious to one of ordinary skill in the art at the time of the present invention to dispose the polysilicon of Mitani in the method of Fischer et al. in order to use a first conductive layer that will be both part of the fuse component and a gate electrode as stated by Mitani in the abstract and constitution. Fischer et al. and Mitani do not disclose the fusible second conductive layer is a metal silicide. Chen teaches in column 5, lines 57 – 65 a fusible conductive layer (62) that is a metal silicide. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the metal silicide layer of Chen in the method of fabricating a fuse upon a semiconductor device of Fischer et al. and Mitani in order to use a preferred conductive material for the fuse that is well known in the art as stated by Chen in column 5, lines 57 – 65.

With regard to claim 51, Fischer et al. discloses in figure 1 disposing the first conductive layer onto the insulative structure, and patterning the conductive material. As applied above the first conductive layer is polysilicon.

With regard to claims 55, the method of Fischer et al. discloses in column 3, lines 42 – 50 patterning comprises disposing a mask adjacent the first conductive layer and removing selected regions of the conductive layer through the mask. As applied above the first conductive layer is polysilicon.

With regard to claim 56, Fischer et al., Mitani and Chen do not disclose that the mask is photoresist. It is well known in the art to dispose a photoresist adjacent the first conductive layer, expose selected regions of the photoresist and develop the selected regions. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the photoresist method in the method of Fischer et al., Mitani and Chen in order to pattern the first conductive layer. As applied above the first conductive layer is polysilicon.

With regard to claims 57 and 58, the method of Fischer et al. discloses in column 3, lines 34 – 50 that the removing comprises isotropically etching the selected regions of the first conductive layer through the mask. As applied above the first conductive layer is polysilicon.

With regard to claim 59, Fischer et al., Mitani and Chen do not disclose etching the selected regions of the first conductive layer with a wet etch. It is well known in the art that etching can comprise wet etching the selected regions first conductive layer. It would have been obvious to one of ordinary skill in the art to use the wet etching method in the process of Fischer et al., Mitani and Chen in order to etch the first conductive layer with tapered edges. As applied above the first conductive layer is polysilicon.

With regard to claim 60, Fischer et al. discloses in figure 2 disposing the second conductive layer adjacent the spaced apart terminal sites and the insulative structure exposed therebetween. As applied above the second conductive layer is a metal silicide.

With regard to claim 62, Fischer et al. discloses in figure 2 patterning the second conductive layer. As applied above the second conductive layer is a metal silicide.

With regard to claim 63, the method of Fischer et al., Mitani and Chen inherently discloses patterning the layer of metal silicide comprising disposing a mask over the semiconductor device and removing selected regions of the layer of metal silicide through the mask.

With regard to claim 64, Fischer et al., Mitani and Chen do not disclose that the mask is photoresist. It is well known in the art to dispose a photoresist mask onto the semiconductor device, expose selected regions of the photoresist and develop the selected regions. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the photoresist method in the method of Fischer et al., Mitani and Chen in order to pattern the metal silicide.

With regard to claims 65 and 66, the method of Fischer et al., Mitani and Chen inherently discloses that the removing comprises anisotropically etching the selected regions of the metal silicide.

With regard to claim 67, Fischer et al., Mitani and Chen does not disclose etching the selected regions of the layer of the second conductive layer with a dry etch. It is well known in the art that etching can comprise dry etching the selected regions of the layer of second conductive layer. It would have been obvious to one of ordinary skill in the art to use the dry etching method in the process of Fischer et al., Szluk et al. and Sandhu in order to etch the metal silicide with vertical edges.

With regard to claim 68, Fischer et al. discloses in figures 2 and 3 the patterning of the second conductive layer comprises defining the at least two terminal regions of the fuse adjacent the spaced apart regions and the central region of the fuse adjacent the insulative structure. As applied above the second conductive layer is metal silicide.

Claims 52 – 54, 69 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al., Mitani and Chen as applied to claims 50 and 51 above, and further in view of Degelormo et al.

Fischer et al., Mitani and Chen do not disclose disposing the polysilicon by chemical vapor deposition. Degelormo et al. teaches in column 6, lines 60-63 of chemical vapor depositing doped polysilicon wherein doping occurs substantially simultaneously with the disposing. The method of Degelormo et al. would further allow the spaced apart regions of polysilicon to be doped, and the doping to occur substantially simultaneously with disposing polysilicon on the insulative structure. It would have been obvious to use the polysilicon disposing method of Degelormo et al. in the method of Fischer et al., Mitani and Chen in order to make lower resistance polysilicon as stated by Degelormo et al. in column 6, lines 32 – 35.

Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al., Mitani and Chen as applied to claims 50 and 60 above, and further in view of Sandhu.

With regard to claim 26, Fischer et al., Mitani and Chen do not disclose that the layer of metal silicide is deposited by chemical vapor deposition. Sandhu discloses in figure 1 that depositing the layer of metal silicide (12) comprises chemical vapor depositing the layer of metal silicide. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the chemical vapor deposition process of Sandhu in the method of Fischer et al., Mitani and Chen in order to deposit a metal silicide film characterized by low impurities, good step coverage, and low stress with the silicon substrate as taught by Sandhu in the abstract.

Claims 71, 74-86, 88-96, 101, 104 and 105 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitani in view of Fischer et al. and Chen

With regard to claim 71, and 74, Mitani discloses in figures 1 and 2 a method of substantially simultaneously fabricating a gate and a fuse on a semiconductor substrate. Mitani discloses in figures 1 and 2 disposes a layer of insulative material (4) over at least an exposed region of the semiconductor substrate (1). Mitani discloses in figures 1 and 2 also disposes a layer of polysilicon (5) over the semiconductor substrate, including over the layer of insulative material and over isolation regions (2) disposed on the semiconductor substrate. Mitani discloses in

figures 1 and 2 patterning at least regions of the layer of polysilicon (5) disposed over at least one isolation region of the isolation regions. Mitani discloses in figures 1 and 2 forming a layer of metal silicide (6) on the layer of polysilicon. Mitani does not disclose defining at least two spaced apart terminal sites of polysilicon. Fischer et al. teaches in figure 1 patterning regions (11) comprising defining at least two spaced apart terminal sites of a conductor layer on at least one isolation region (10) and between which a portion of the at least one isolation region is exposed therebetween. Fischer et al. also teaches in figure 2 and 3 defining a fuse comprising defining a central region (111) disposed adjacent and substantially between the at least two spaced apart terminal sites and defining at least two terminal regions, each terminal region continuos with an end of the central region and disposed adjacent one of the at least two spaced apart terminal sites. Fischer also teaches in figure 3 removing conductive material of the layer from areas of the layer located around the at least two spaced apart terminal sites. It would have been obvious to one of ordinary skill in the art at the time of the present invention to pattern the silicon layer of Mitani with the two spaced apart terminal sites of Fischer et al. in order to create a laser-programmable or electric-current-programmable link features having locally reduced cross-sectional area resulting from locally reduced thickness of a conductive path, while width remains essentially constant, as stated by Fischer et al. in column 1, lines 60 – 65. Mitani and Fischer et al. do not disclose the fusible second conductive layer is a metal silicide. Chen teaches in column 5, lines 57 – 65 a fusible conductive layer (62) that is a metal silicide. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the metal silicide layer of Chen in the method of fabricating a fuse upon a semiconductor device of Mitani and Fischer et al. in order to use a preferred conductive material for the fuse that is well known in the art as stated by Chen in column 5, lines 57 – 65.

With regard to claim 75, the method of Mitani, Fischer et al. and Chen defining the at least two spaced apart terminal sites inherently comprises disposing a mask over the layer of polysilicon and removing selected regions of the layer of polysilicon through the mask.

With regard to claim 76, Mitani, Fischer et al. and Chen do not disclose that the mask is photoresist. It is well known in the art to dispose a photoresist mask over a layer of polysilicon, expose selected regions of the photoresist and develop the selected regions. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the photoresist method in the method of Mitani, Fischer et al. and Chen in order to pattern the polysilicon.

With regard to claims 77 and 79, the method of Mitani, Fischer et al. and Chen inherently discloses that the removing comprises isotropically etching the polysilicon.

With regard to claim 78, Mitani, Fischer et al. and Chen do not disclose etching the selected regions with a wet etch. It is well known in the art that etching can comprise wet etching the selected regions of polysilicon. It would have been obvious to one of ordinary skill in the art to use the wet etching method in the process of Mitani, Fischer et al. and Chen in order to etch the polysilicon to have slanted sidewalls.

With regard to claims 80 and 81, Mitani discloses in figures 1 and 2 patterning gate regions of the layer of polysilicon that occurs substantially simultaneously with the patterning the at least regions of the layer of polysilicon.

With regard to claim 82, the method of Mitani inherently comprises disposing a mask over the layer of polysilicon and removing selected regions of the layer of polysilicon through the mask.

With regard to claim 83, Mitani does not disclose that the mask is photoresist. It is well known in the art to dispose a photoresist mask onto a semiconductor device, expose selected regions of the photoresist and develop the selected regions. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the photoresist method in the method of Mitani in order to pattern the polysilicon.

With regard to claims 84 and 86, the method of Mitani inherently discloses that the removing comprises anisotropically etching the selected regions.

With regard to claim 85, Mitani does not disclose etching the selected regions with a dry etch. It is well known in the art that etching can comprise dry etching the selected regions. It

would have been obvious to one of ordinary skill in the art to use the dry etching method in the process of Mitani in order to etch the polysilicon to have vertical sidewalls.

With regard to claim 88, the method of Mitani, Fischer et al. and Chen defining the gate from at least the layer of metal silicide inherently comprises disposing a mask over the layer of metal silicide and removing selected regions of the layer of metal silicide through the mask.

With regard to claim 89, Mitani, Fischer et al. and Chen do not disclose that the mask is photoresist. It is well known in the art to dispose a photoresist mask over a layer of metal silicide, expose selected regions of the photoresist and develop the selected regions. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the photoresist method in the method of Mitani, Fischer et al. and Chen in order to pattern the metal silicide.

With regard to claims 90 and 92, the method of Mitani, Fischer et al. and Chen inherently discloses that the removing comprises anisotropically etching the selected regions.

With regard to claim 91, Mitani, Fischer et al. and Chen do not disclose etching the selected regions with a dry etch. It is well known in the art that etching can comprise dry etching the selected regions. It would have been obvious to one of ordinary skill in the art to use the dry etching method in the process of Mitani, Fischer et al. and Chen in order to etch the metal silicide to have vertical sidewalls.

With regard to claims 93 – 96, Mitani, Fischer et al. and Chen read on the claimed invention either inherently or obviously as applied to similar above claims.

With regard to claim 101, Mitani discloses in figure 1 doping at least one source region (18) and at least one drain region (19) of the semiconductor substrate, the at least one source region and the at least one drain region disposable adjacent the gate on opposite sides thereof.

With regard to claim 104, the removing of Fischer et al. further comprises exposing the insulating structure beneath the areas.

With regard to claim 105, the removing comprises exposing an insulating structure beneath the areas.

Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitani, Fischer et al. and Chen as applied to claim 71 above, and further in view of Degelormo et al.

Mitani, Fischer et al. and Chen do not disclose disposing the polysilicon by chemical vapor deposition. Degelormo et al. teaches in column 6, lines 60-63 of chemical vapor depositing doped polysilicon. It would have been obvious to use the polysilicon disposing method of Degelormo et al. in the method of Mitani, Fischer et al. and Chen in order to make lower resistance polysilicon as stated by Degelormo et al. in column 6, lines 32 – 35.

Claim 87 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitani, Fischer et al. and Chen as applied to claim 71 above, and further in view of Sandhu.

Mitani, Fischer et al. and Chen do not disclose disposing metal silicide by chemical vapor deposition. Sandhu teaches in figure 1 disposing a layer of metal silicide comprising chemical vapor depositing the layer of metal silicide (12). It would have been obvious at the time of the present invention to use the disposing of metal silicide method of Sandhu in the method of Mitani, Fischer et al. and Chen in order to use the properties of low bulk resistance and low stress of the metal silicide as stated by Sandhu in column 1, lines 12 – 21.

Claims 97 – 100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitani, Fischer et al. and Chen as applied to claim 71 above, and further in view of Ukeda et al.

Mitani, Fischer et al. and Chen do not disclose removing exposed regions of the insulative material through the layer of polysilicon. Ukeda et al. discloses in figures 1f and 1g and columns 3 and 4, lines 64 – 67 and 1 – 15 respectively removing exposed regions of the layer of insulative material (2) through the layer of polysilicon by anisotropically, dry etching the exposed regions of insulative material. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the removing methods of Ukeda et al. in the method of Mitani, Fischer et al. and Chen in order to complete the formation of a transistor furnished with a gate electrode as described by Ukeda et al. in column 4, lines 10 – 15.

(10) Response to Argument

It is noted that sections (A) and (B) of appellants Argument, bridging pages 9-12, merely present a brief review of the applicable law and a summary of each reference relied upon by the examiner. Thus, these sections do not present any arguments as to the merits of the applied rejections and do not persuasively show patentability of the claims.

Fischer in View of Chen

Appellant argues that a *prima facie* case of obviousness has not been established with respect to the subject matter recited in any of claims 17, 19-24, 26-33, 102 and 103 and that without the benefit of hindsight one of ordinary skill in the art would not have been motivated to combine the teachings of Fischer with Chen in the manner asserted (page 13 paragraph 2 of Appellant's brief).

This argument is not persuasive. The rejections applied do properly establish a *prima facie* case of obviousness as the rejections have met the three basic criteria outlined in *In re Vaeck* (cited by Appellant as applicable law on the paragraph bridging pages 9 and 10 of Appellant's brief). The rejections applied have met the three criteria as follows: the rejections have provided a suggestion or motivation known in the prior art to modify the reference or combine the teachings ("to use a preferred conductive material for the fuse that is well known in the art", see the rejection above, page 4 paragraph 1); the combination has a reasonable expectation of success (since the metal silicide is taught as the preferred material and is taught by Chen as functioning as

a fuse, one would reasonably expect the metal silicide layer to operate as intended in the combination); and the prior art references as combined teach all of the claimed limitations.

Further, in response to appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the appellant's disclosure, such a reconstruction is proper. See In re McLaughlin, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In the instant case, the judgment of obviousness relies solely on knowledge and teachings from the prior art references themselves and thus does not rely on any improper hindsight reconstruction. The references themselves provide suggestion of motivation for combining the teachings of Fischer and Chen and thus does not rely upon improper hindsight for the motivation.

Appellant further argues that neither Fischer nor Chen provides one of ordinary skill in the art with any reason to substitute a silicide for one of the conductive layers of the Fuse of Fischer and that Fischer is limited to the use of aluminum, tungsten or polysilicon for the programmable portion of the fuse (page 13 paragraph 3 of Appellant's brief).

This argument is not persuasive. Chen clearly teaches on column 5 lines 57-63 certain materials that may be used as a fuse and clearly states that the fuse layer is "more preferably formed of tungsten silicide." This statement in the prior art teaches that one of ordinary skill in the art would recognize tungsten silicide (a "silicide") as being a more preferred material for the fuse layer and thus provides a suggestion to modify Fischer to substitute the tungsten silicide layer of Chen for the fuse layer 12 of Fischer. Thus, Chen explicitly provides a suggestion for the material substitution. Further, Chen teaches two of the same materials of Fischer can be used as the fuse layer (aluminum or polysilicon) and states that tungsten silicide is preferred over these materials. This teaching provides motivation to use the tungsten silicide instead of the aluminum or polysilicon in order to use the art recognized preferred material.

Further, assuming *arguendo,* even if the selection of Chen's tungsten silicide for the fuse layer of Fischer is not obvious based upon the tungsten silicide being recognized in the art as a more preferred material, the substitution is still obvious. Substituting art recognized equivalents for the same purpose is obvious. The selection of a silicide for the fuse layer, or the substitution of the silicide of Chen for the fuse layer 12 of Fischer, is obvious since it relies upon mere substitution of one art recognized equivalent material, in fact the art recognized more preferred material, for another. Fischer teaches that their fuse layer 12 can be made of aluminum, tungsten or polysilicon (as admitted by Appellant, page 13 paragraph 3 of Appellant's brief). Thus, at the time of Fischer's patent in 1993, it was known to use aluminum, tungsten or polysilicon as the fuse layer. Chen teaches that fuse layers can be made of aluminum,

titanium tungsten, tungsten silicide, platinum silicide, polysilicon, titanium polycide, tungsten polycide or molybdenum polycide and is more preferably formed of tungsten silicide (Chen, column 5 lines 57-63). Thus, at the time of Chen's patent in 1998, a variety of materials were known in the art as equivalents for providing a fuse layer, including the aluminum or polysilicon previously taught by Fischer, and it was further known that tungsten silicide was a more preferred known equivalent material over the aluminum or polysilicon. As per MPEP 2144.06, substituting art recognized equivalents for the same purpose validly supports a *prima facie* case of obviousness.

Appellant further argues that neither Chen nor Fischer includes a teaching or suggestion that would have provided one of ordinary skill in the art with any reason to add an additional layer of conductive material at either terminal end of the single layer fuse of Chen and that any such modification would have unnecessarily increased the complexity of the fuse fabrication process of Chen (page 13 paragraph 4 of Appellant's brief).

This argument is not persuasive since the rejection applied does not rely upon adding a layer of Fischer into the process of Chen. Instead the rejection relied upon modifying Fischer by substituting the preferred fuse material of Chen for the fuse material of Fischer.

Appellant further argues that from the teachings of Fischer and Chen, it is apparent that without the benefit of improper hindsight reconstruction, one of ordinary

skill in the art would have had no motivation to combine the teachings from Fischer and Chen in the manner asserted, that no teachings that were generally available to those of ordinary skill in the art at the appropriate time have been supplied to show otherwise, and that as such the applied rejection is based entirely upon an improper hindsight reconstruction of the subject matter recited in the claims (page 14 paragraph 1 of Appellant's brief). These arguments are not persuasive.

Initially, it is noted that these arguments are not clear as to whether they are arguing against the combination of references as applied in the appealed rejection or against Appellant's proposed combination (modifying the single layer fuse of Chen by adding an additional layer at either terminal end as taught by Fischer). As discussed previously, motivation or suggestion to combine the teachings from Fischer and Chen in the manner asserted by the Examiner has been provided. Chen explicitly teaches that using tungsten silicide as the fuse material is more preferred over a list of other materials including the materials taught by Fischer. Thus, Chen explicitly provides a suggestion for the combination of the teachings. Further, as discussed above, the substitution of art recognized equivalents for the same purpose is obvious. See MPEP 2144.06. Therefore, motivation has been provided from the teachings of the references themselves and the rejection does not rely on improper hindsight reconstruction.

The suggestion or motivation for the combination of Fischer with Chen comes from Chen itself. Thus, a teaching that was generally available to those of ordinary skill in the art at the time of the invention has been supplied to show the motivation or suggestion.

As such, the applied rejection is not based in any way upon improper hindsight reconstruction of the claimed subject matter.

Appellant further argues that by touting the usefulness of aluminum, tungsten, or polysilicon for use in forming the programmable portion of the fuse, Fischer teaches away from the asserted motivation to substitute a silicide for the programmable portion of the fuse (page 14 paragraph 2 of Appellant's brief).

Initially, it is noted that Fischer does not particularly "tout" the usefulness of aluminum, tungsten or polysilicon. Rather, Fischer merely teaches that these materials may be used for the programmable portion of the fuse. Nowhere does Fischer teach away from using a silicide or teach that only aluminum, tungsten or polysilicon can possibly be used. In fact, Fischer is silent as to silicides and thus does not provide any explicit teaching away. It is noted that appellant has not provided any citations or particular passages in Fischer in support of their alleged teaching away argument.

For these reasons appellant's arguments are not persuasive.

Fischer, Chen and Mitani

In the last line of page 14 of the brief, Appellant states that claim 18 is allowable as depending from claim 17, which is allowable. This is not persuasive as claim 17 is not allowable.

Appellant argues that Mitani does not remedy the deficiencies that have been previously noted with respect to the combination of Fischer and Chen and that one of ordinary skill in the art wouldn't have been motivated to combine the teachings of Mitani with those of Fischer and Chen in the manner asserted by the Examiner (page 15 paragraph 1 of Appellant's brief).

This is not persuasive. First, as explained above, there are no deficiencies with respect to the combination of Fischer and Chen with regard to the claims that were rejected under Fischer and Chen. Second, as explicitly stated in the rejection of claim 18, the motivation for the asserted combination is "in order to dispose a conductive material layer that will be both part of the fuse component and a gate electrode." Thus, one would be motivated to combine the teachings as asserted in the rejection.

Appellant argues that Fischer is limited to forming a multilayer fuse, the upper layer of which is configured to be "blown" to program the fuse and none of the layers comprise metal silicide, nor does Fischer provide motivation to use metal silicide to form one of the layers of the fuse (page 15 paragraph 2 of Appellant's brief).

This is not persuasive to overcome the obviousness rejection based upon multiple references since Fischer was not relied upon for the metal silicide or for providing motivation to use metal silicide. These features, both the metal silicide and the motivation/suggestion for using the metal silicide, were taught by Chen. One cannot show nonobviousness by attacking references individually where the rejections are

based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed cir. 1986).

Appellant further argues that Chen teaches forming a single layer fuse from a variety of materials, including metal silicide, but does not provide one of ordinary skill in the art with any motivation to also use another conductive material and, thus, multiple layers at the ends, or terminals, of the fuse (page 15 paragraph 3 of Appellant's brief).

This is not persuasive as the applied rejection does not rely upon modifying Chen to include another conductive material or multiple layers at the ends of the fuse. The applied rejection relies upon Chen's teaching of using a metal silicide for the fuse layer.

Appellant further argues that Mitani teaches that the upper metal silicide layer, not the lower polysilicon layer, is patterned to form terminal regions and that it is thus the lower polysilicon layer of Mitani, not the upper metal silicide layer of that fuse, that forms the region of the fuse which is to be ruptured (page 15 paragraph 4 of Appellant's brief).

This argument is not persuasive as Mitani is not relied upon to teach patterning the upper or lower layer to form the terminals or thus using the upper or lower layer to form the region to be ruptured. These features are taught by Fischer. Mitani is merely relied upon to teach using polysilicon as the lower layer in the two layer fuse of Fischer such that the lower layer can be both part of the fuse component and a gate electrode for a transistor as taught by Mitani in the abstract and constitution sections. This use of

the polysilicon layer in the fuse and the gate electrode, formed simultaneously, is obvious since it allow simultaneous processing that cuts down on the individual number of steps that need to be performed.

Appellant further argues that one of ordinary skill in the art wouldn't have been motivated to combine teachings from Fischer, Chen and Mitani in the asserted manner because none of these references would have provided one of ordinary skill in the art with any clear guidance as to the function of metal silicide as the fusible element of a multi-layered fuse (page 15 paragraph 5 of Appellant's brief).

This argument is not persuasive. First it is noted that the applied rejection did supply motivation for the rejection. Appellant has not argued against the supplied motivation. Rather, appellant has argued that there is no clear guidance as to the function of the metal silicide as the fusible element of a multi-layered fuse. It is noted that the "multi-layered" portion of the fuse of Fischer (the reference relied upon for the underlying conductive layer patterned into terminals and the overlying fusible layer overlying and connecting the two terminals) is only in the terminal region, that is the peripheral region, and not the central region where the fuse is blown (see Fischer figure 3, region 111). Thus, in the central region where the fuse is blown Fischer only includes a single layer in the same manner than Chen teaches a single layer for the fusible portion. As such Chen provides clear guidance as to the function of the metal silicide as the fusible element. Chen teaches that the metal silicide as the fusible element functions as a fusible element by blowing the fuse. In combining the metal silicide of

Chen into the fuse of Fischer, the fusible element is still only a single layer and one of ordinary skill in the art would recognize that it would function in the same manner as the single silicide layer in Chen.

Appellant further reiterates their argument that any such motivation could only have come from improper hindsight reasoning (page 16, paragraph 1 of Appellant's brief).

This is not persuasive. As previously explained, the rejections presented rely solely on information and knowledge provided by the references themselves and thus does not constitute improper hindsight.

Appellant further argues that one having ordinary skill in the art would not have any reason to expect that combining the methods of Fischer, Chen and Mitani would result in the method recited in claim 18. Appellant states that due to the extreme divergence between the methods of the references, there is no way that all of the teachings of these references could be considered in developing a fuse fabrication method such as that recited in claim 18 and that the most likely result of such a combination would resemble the method taught in Mitani, without removal of material of the metal silicide layer from the region of the fuse which is configure to rupture during patterning of the metal silicide layer (page 16 paragraph 2 of Appellant's response).

These arguments are not persuasive. First, one of ordinary skill in the art would have reason to expect that combining the references would result in the method recited

in claim 18. As explained in the rejection, Fischer teach all the claimed limitations except for using a metal silicide for the upper layer and for using polysilicon as the patterned conductive layer. Chen teach using metal silicide as the fusible layer and provide the suggestion for doing so (use of the more preferable material). Mitani teach forming polysilicon as the lower layer so that the lower layer can be both part of the fuse component and a gate electrode for a transistor. Thus, the references do reasonably suggest the combination in the manner relied upon in the rejection.

Second, the references are all from the same field of endeavor of forming semiconductor devices and more particularly forming fuses. As such, there is not an extreme divergence between the methods of the references. Further, one of ordinary skill in the art could consider all the teachings of the references in developing a method such as that of claim 18. As evidence that all of the teachings of all of the references could be considered see appellant's proposed combination of the references in which they take into account all the teachings of all of the references (page 16 paragraph 2, last sentence of Appellant's brief). As shown in the applied rejection, one could consider all the teachings of all of the references and in fact would be motivated to do so to produce the method recited in claim 18.

Third, appellant's proposed combination of the references is highly speculative and is not well supported by any evidence on record. The mere possibility that the references could theoretically be combined in a manner different than that relied upon in the rejection does not refute the case of *prima facie* obviousness that has been established.

Thus appellant's arguments are not persuasive.

Fischer, Chen and Sandhu

Appellant argues that claim 25 is allowable as depending from claim 17 which is allowable and that Sandhu does not provide any teaching or suggestion that remedies the aforementioned deficiencies in the asserted combination of Fischer and Chen (page 17 paragraph 2 of Appellant's brief).

This is not persuasive. As explained above claim 17 is not allowable and there are no deficiencies with respect to the combination of Fischer and Chen with regard to the claims that were rejected under Fischer and Chen.

It is noted that Appellant has not presented any further arguments with regard to the combination of Fischer, Chen and Sandhu.

Fischer, Mitani and Chen

Appellant's arguments with regard to the combination of Fischer, Mitani and Chen merely consist of stating that there would have been no motivation or reason to expect the asserted combination to be successful as Appellant previously set forth (page 17 paragraphs 4 and 5 of Appellant's brief).

For the reasons set forth above in regard to the combination of Fischer, Chen and Mitani, these arguments are not persuasive.

It is noted that Appellant has not presented any further arguments with regard to the combination of Fischer, Mitani and Chen.

Fischer, Mitani and Chen in view of Degelormo

Appellant argues that Degelormo includes no teaching or suggestion that the CVD process thereof may be used to fabricate any part of a fuse or structures directly associated with a fuse (page 18 paragraph 3 of Appellant's brief).

This is not persuasive. Degelormo teaches depositing polysilicon by CVD. One of ordinary skill in the art of semiconductor fabrication would recognize that a method of depositing polysilicon by CVD is a process that could be performed on a variety of structure in the formation of a variety of devices. Thus, it is well within the skill of the ordinary artisan that the CVD method of Degelormo could be used to deposit a layer that is later used in a fuse. Further, in the combination of Fischer, Mitani and Chen the polysilicon layer is already taught as being used to fabricate a part of the fuse. The only element missing is not using CVD to deposit polysilicon specifically for a fuse but rather only the use of CVD to deposit polysilicon. As such, Degelormo does not need to teach depositing a fuse layer of polysilicon by CVD but merely needs to teach depositing polysilicon by CVD. Degelormo teaches this missing feature. Since Degelormo is from the same field of endeavor as Fischer, Mitani and Chen one of ordinary skill in the art would have a reasonable expectation of success in applying the CVD method of Degelormo in the process of Fischer, Mitani and Chen as combined.

Appellant also argues that Degelormo does not provide any teaching or suggestion that would remedy the deficiencies of Fischer, Mitani and Chen with respect to their inabilities to have provided one of ordinary skill in the art with the requisite motivation to make the asserted combination of reference teachings (page 18 paragraph 4 of Appellant's brief).

This is not persuasive. As shown above with regard to Fischer, Mitani and Chen and as shown above with regard to Fischer, Chen and Mitani, there are no deficiencies as these references have been shown to provide proper motivation for the combination.

Fischer, Mitani, Chen and Sandhu

Appellant's arguments with regard to the combination of Fischer, Mitani, Chen and Sandhu merely consist of stating that Sandhu does not remedy the aforementioned deficiencies with the combination of Fischer, Mitani and Chen (page 19 paragraphs 3 and 4 of Appellant's brief).

For the reasons set forth above in regard to the combination of Fischer, Chen and Mitani, these arguments are not persuasive since it has been shown that there are no deficiencies in the combination of Fischer, Chen and Mitani.

It is noted that Appellant has not presented any further arguments with regard to the combination of Fischer, Mitani, Chen and Sandhu.

Mitani, Fischer and Chen

Appellant's arguments with regard to the combination of Mitani, Fischer and Chen merely consist of stating that for the reasons previously presented one of ordinary skill in the art would not have been motivated to combine the teachings in the asserted manner and that one of ordinary skill in the art would not believe that combining the references would result in the method recited in the claims (page 20 paragraphs 3 and 4 of Appellant's brief).

As explained in the rejection itself and as addressed above in response to appellant's previous arguments, proper motivation was provided in the references themselves and one of ordinary skill in the art would reasonably combine the references to achieve the method as recited in the claims. For these reasons appellant's arguments are not persuasive.

It is noted that Appellant has not presented any further arguments with regard to the combination of Mitani, Fischer and Chen.

Mitani, Fischer and Chen in View of Degelormo

Appellant merely argues that claim 72 is allowable since it depends from claim 71 which is allowable. This is not persuasive as claim 71 is properly rejected.

It is noted that Appellant has not presented any further arguments with regard to the combination of Mitani, Fischer and Chen in view of Degelormo.

Mitani, Fischer and Chen in View of Sandhu

Appellant merely argues that claim 87 is allowable since it depends from claim 71 which is allowable. This is not persuasive as claim 71 is properly rejected.

It is noted that Appellant has not presented any further arguments with regard to the combination of Mitani, Fischer and Chen in view of Sandhu.

Mitani, Fischer and Chen in view of Ukeda

Appellant argues that Ukeda does not teach or suggest that the process disclosed therein may be used to fabricate a fuse (page 21 paragraph 4 of Appellant's brief)

This argument is not persuasive. First, it is noted that the language of claims 97-100 does not require the removal or etching step to be performed on a fuse. Rather the language of the claims merely requires removing the insulative layer where it is exposed through the polysilicon layer. Second, Ukeda was not relied upon for teaching etching (the process step Ukeda is relied upon for) to fabricate a fuse. Rather, Ukeda is relied upon to teach removing exposed regions of the layer of insulative material through the layer of polysilicon. Applying this removal to the process of Mitani, the gate dielectric material 4 is removed where it is exposed around the gate electrode 7 (see Mitani figure 1(a)). Thus, the rejection does not need to show the process of Ukeda used to fabricate a fuse.

Appellant further argues that Ukeda does not remedy the deficiencies of Mitani, Chen and Fischer with respect to providing motivation to one of ordinary skill in the art to combine the teachings of these references and that it is cleat that Ukeda does not include any teaching that would give a reasonable expectation that the combination would provide a successful method for fabricating a fuse.

These arguments are not persuasive. First, since as discusses above there are no deficiencies with respect to the motivation to combine Mitani, Chen and Fischer, Ukeda does not need to remedy any deficiencies in order to establish a valid rejection. Second, since all the references are from the same field of endeavor (fabricating semiconductor devices) one of ordinary skill in the art would reasonably expect success with the process applied from combining the references. Further, appellant's assertion that one of ordinary skill in the art would not have give a reasonable expectation that the combination would provide a successful method for fabricating a fuse is a mere conclusory allegation by the appellant that is unsupported by any factual evidence or sound reasoning. Thus, these arguments are not persuasive.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

N. Drew Richards

N. DREW RICHARDS
PRIMARY EXAMINER

Conferees:

Ken Parker

David Blum